

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): Venkat Selvamanickam, et al.

Title: METALORGANIC CHEMICAL VAPOR DEPOSITION (MOCVD)
PROCESS AND APPARATUS TO PRODUCE MULTILAYER HIGH-
TEMPERATURE SUPERCONDUCTING (HTS) COATED TAPE

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Commissioner for Patents

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DECLARATION UNDER 37 C.F.R. §1.132

Sir, I hereby declare and state:

1. I am a joint inventor of the subject matter presently claimed in the above-identified patent application.

2. I received my doctorate degree in Materials Engineering from the University of Houston in Houston, TX.

3. I have been employed by IGC/SuperPower, Inc. since 1994, wherein I have been mainly engaged in research and development of superconducting materials, superconducting conductors, and processes for forming same.

4. I have reviewed the Office Action dated October 18, 2005, including the positions taken by the PTO with respect to several prior art references. I have also particularly reviewed the subject matter of US 2005/0173679, Mannhart et al. (Mannhart). For the reasons discussed below, Mannhart fails to disclose (or suggest) all features of the claimed invention.

5. The claimed invention is drawn to a superconductive article comprising a substrate tape and a superconductive layer. The superconductive layer notably includes a plurality of individually identifiable superconductive films of the same material, the films being disposed one atop another and atomically bonded to each other free of an intervening bonding layer. As described in the present specification, the films are formed by a metalorganic chemical vapor deposition (MOCVD) process, in which metalorganic precursors are reacted with each other in a deposition chamber, the reaction product forming a superconductive material that deposits on the substrate tape. As described in the present specification, pages 23+ in connection with FIGs. 1-4b, the substrate tape is translated through an MOCVD system containing multiple compartments arranged in series, each defining a deposition zone (see Zones A-E). Each zone has associated unique control parameters as described in Tables 1-5. As the substrate translates through the MOCVD system, the substrate tape experiences multiple deposition events, each deposition event corresponding to each zone, thereby forming an identifiable, discrete superconducting film. That is, by passage of the tape through a zone, the zone forms as deposited superconductive material in the form of a film.

MOCVD deposition results in epitaxial growth of the depositing film. As such, the microstructure of the preceding film, i.e. crystal grain sizes and orientation, is continued and duplicated in the depositing film. That is, the depositing film is atomically bonded to the preceding film. More specifically, the atoms of the depositing film atomically bond to the atoms of the preceding film as a result of the sequential MOCVD process flow. While a telltale interfacial boundary remains between films, the films are nevertheless necessarily atomically bonded to each other.

6. In contrast, Mannhart is drawn to a process for joining separate superconductive films through physical contact or an intermediate layer, and does not disclose direct, atomic bonding with each other. In one embodiment, Mannhart discloses physically clamping two superconductors together (FIG. 5). In another, Mannhart discloses melting the intermediate layer to fuse the two adjacent superconductive layers. I acknowledge that Mannhart discloses multilayers in paragraph [0041]. However, such general suggestion does not extend to the superconductive layer as claimed, which features multiple films atomically bonded directly to

each other. Adding yet additional layers to the embodiments of Mannhart remains reliant on physically bonding (clamping) or use of intermediate layers.

7. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements were made with the knowledge that willful false statements and the like, so made, are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Respectfully submitted,

Date

Venkat Selvamanickam